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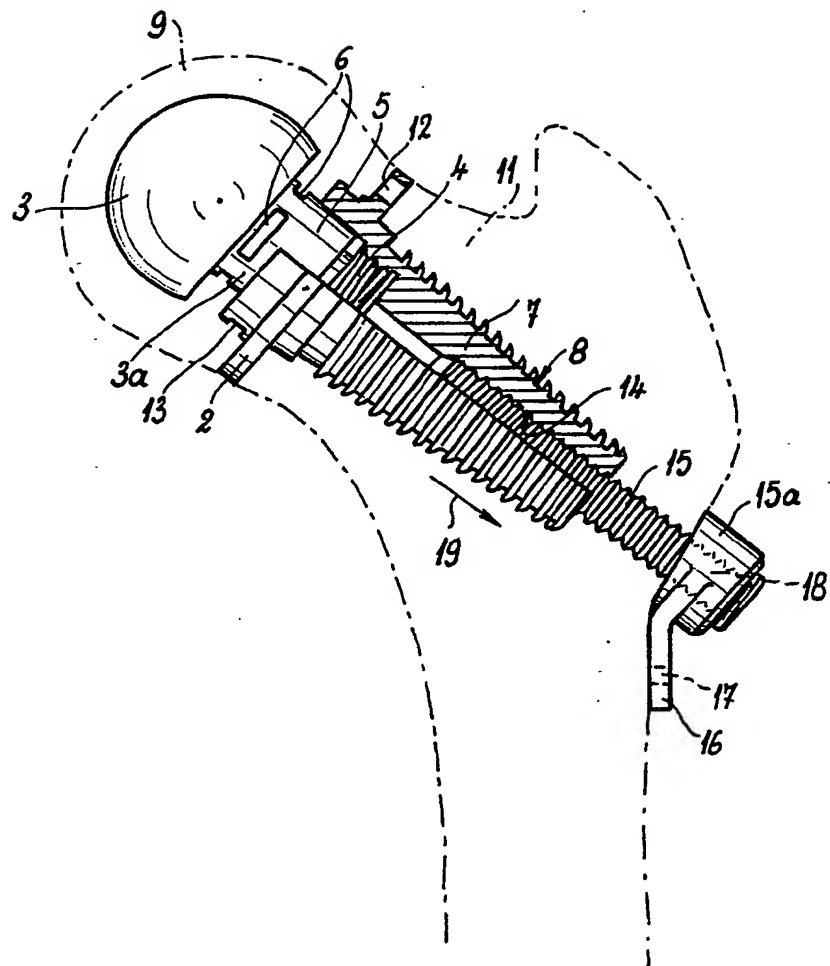
**Hulse & Co**

(54) **A hip prosthesis**

(57) A hip prosthesis having a base intended to lie against the resected neck of the femur, and from which a ball projects upwardly, has a conical hollow rod which is provided with a sloped screw thread which may be coated with a porous material. The rod is screwed into the femur neck and retained in place without adhesive. Additional anchorage is obtained by passing a recall screw through the femur neck from beneath into the hollow rod which is internally threaded. The ball is rotated by means of a key so as to seat it on the base.

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## SPECIFICATION

### A hip prosthesis

5 This invention relates to a hip prosthesis.

Two types of hip prostheses are now used:-  
double sealed cup prostheses and intramedul-  
lary prostheses. Double seal cup prostheses  
comprise a metal cup sealed on to the head of  
10 the bored femur and a plastic cup sealed on  
to the cotyloid cavity. This type of prostheses  
has the drawback that it is difficult to place  
because the head of the femur must have  
been previously drilled. Further, there are  
15 risks of necrosis of the femur head under the  
cement, such necrosis leading to bone break-  
age thereby making new surgery necessary.  
Intramedullary prostheses comprise a femoral  
head intended to be engaged in the medullary  
20 canal of the femur after total resection of its  
head. It is quite obvious that such a prosthe-  
sis is not physiologically ideal because it is  
placed at the sacrifice of the femoral neck  
and, further, the rod placed in the medullary  
25 canal has the drawback of considerably stiff-  
ening the femur. Further, installing this type  
of prosthesis is never easy and risks of femo-  
ral fracture are always to be feared. Finally,  
necrosis of the bone caused by the cement  
30 during its polymerisation causes unsealings  
over time.

Hip prostheses have been proposed made  
up of a plate forming a base and carrying, on  
its front face, a spherical head intended to  
35 replace the femur head and, on its back face,  
a threaded rod to be fastened in the neck of  
the femur. The back face of the plate rests  
against the truncated end of the neck of the  
femur, and the front face of the plate further  
40 exhibits means allowing its rotational move-  
ment. This prosthesis, in comparison with the  
intramedullary prostheses, has the advantage  
preserving the neck of the femur which avoids  
any intervention into the medullary canal and,  
45 consequently, preserves elasticity for the fe-  
mur. However, it exhibits the drawback of  
requiring a relatively long and difficult surgical  
emplacement.

The object of the invention is to remedy the  
50 above drawbacks by facilitating the emplace-  
ment of the prosthesis and considerably re-  
ducing the time necessary for the surgery.

According to the present invention a hip  
prosthesis comprises a plate forming a base  
55 and carrying, on its front face, a spherical  
head intended to replace the femur head and,  
on its back face, a conical threaded rod able  
to be screwed into the neck of the femur after  
resection of the femur head so that the back  
60 face of the plate rests against the truncated  
end of the femur neck, the front face of the  
plate further comprising means to permit seat-  
ing of said spherical head by rotation using a  
suitable tool.

65 Preferably the thread of the rod is sloped

slightly so that the use of a sealant in the  
neck of the femur is not essential.

A further preference is that the spherical  
head is connected to the base removably, for  
70 example, by means of a cylindrical thread and  
a conical bearing, as described and claimed in  
the French Certificate of Addition, No.  
7613189, in the name of the Applicants. This  
arrangement makes possible various hip oper-  
75 ations without the need of removing the femo-  
ral prosthesis.

To assist a still tighter hold of this prosthe-  
sis in the neck of the femur without using  
sealant, the lower or free end of the threaded  
80 rod may be provided with a tapped bore able  
to receive a recall screw, the head of which is  
intended to rest directly, or by means of an  
intermediate plate, against the cortex of the  
femur, opposite the neck.

To eliminate any risk of the unscrewing of the  
prosthesis, the head of the recall screw may  
rest against the cortex of the femur by means  
of an intermediate plate provided with a hole,  
making possible its fastening by a screw to the  
90 femur. The head of the threaded recall screw  
itself is externally threaded and goes through  
a tapped hole in the plate and the threading  
pitch of this hole and, consequently, that of  
the head of the recall screw is less than that  
95 of the head of this screw. This arrangement  
results in a differential effect which results in  
a strong pull exerted on the rod of the pros-  
thesis as the head of the recall screw enters  
the tapped hole in the plate, and tends to pull  
100 the base strongly against the truncated end of  
the neck of the femur. This differential effect  
further has the result of practically eliminating  
any risk of the prosthesis coming unscrewed.

To improve still more the hold of the  
105 threaded rod in the neck of the femur, its  
thread is advantageously coated, as is known,  
with aluminium oxide, which gives it a porous  
surface state and, consequently, a better hold  
in the neck of the femur.

One embodiment of the invention will now  
be described with reference to the accompa-  
nying diagrammatic drawing which is a part  
sectional side elevation of a hip prosthesis.

The illustrated prosthesis is made up of a  
115 plate 2 forming the base. On its front face,  
the plate 2 carries a spherical head 3 which is  
preferably removably fastened to the plate 2  
as described in French Certificate of Addition  
No. 7613189 in the name of the Applicants,  
120 i.e., by a cylindrical thread 4 and a conical  
bearing 5. In this case, a rod 3a of the head  
3 has at its end located on the side of  
spherical head 3, flat parts 6 permitting it to  
be grasped by a flat key for rotation thereof.  
125 On its back face, the plate 2 carries a  
threaded rod 7 with a conical outside shape  
and having an outside conical thread 8 with a  
slight slope.

The prosthesis is intended to be fastened to  
130 the femur of a patient after resection of the

head 9 of the femur, which makes it possible to preserve practically the whole neck 11 of the femur. Placement of the prosthesis is therefore made by engagement of threaded conical rod 7 in a bore made in the neck of the femur 11 after resection of the head 9 to the point that the back face of plate 2 is supported against the truncated end of the neck of the femur 11.

For this purpose, the plate 2 comprises means making possible its driving-in by rotation, such as holes 12 making possible the engagement of a key with lugs, or flat parts 13 making possible the use of a flat key.

The conical shape of rod 7 and of the thread 8 makes possible a much more rapid placement than if the rod and thread were cylindrical. Actually, the conical shape makes it possible to almost totally introduce the rod 7 without screwing, the screwing having to be performed only at the end of the introduction. The slight slope of the thread 8 has the effect of making the screwing irreversible and, consequently, of considerably reducing the risks of unscrewing of the prosthesis, and making the use of sealant almost totally unnecessary. However, to improve the hold of the rod 7 in the neck of femur 11, the thread 8 is advantageously coated with aluminium oxide which provides it with a porous surface and reinforces its hold in the neck of the femur 11.

Again, according to another advantageous characteristic of the invention to ensure even better that unscrewing of the rod 7 will not occur, the free or narrow end of the rod 7 is provided with a tapped bore 14 in which can be engaged a recall screw 15, whose head rests against the cortex of the femur opposite the femur head 9.

According to an improved embodiment of the device, there is associated with a recall screw 15 a curved plate 16 shaped to be applied in a complementary manner against the femur cortex. The plate 16 has a smooth bore 17 preferably drilled for passage of a screw making possible its fastening to the femur. Such plate may also have a tapped hole 18 intended to receive the externally threaded head 15a of the recall screw 15, the thread of the head 15a and, consequently, of the tapped hole 18 having a pitch less than that of the recall screw 15, from which results a differential effect assuring a strong pull in the direction of arrow 19 on the rod 7 of the prosthesis which has the effect of eliminating any risk of unscrewing of the prosthesis.

As can be seen, the prosthesis of the invention does not require passage into the medullary canal of the femur which thereby preserves all of its flexibility. As also can be seen from the above description, the prosthesis of the invention makes possible the use of the removable spherical head, which avoids having to remove the body of the prosthesis and particularly its rod 7 from the neck of femur

11 during an operation at the hip.

#### CLAIMS

1. A hip prosthesis comprising a plate forming a base and carrying, on its front face, a spherical head intended to replace the femur head and, on its back face, a conical threaded rod able to be screwed into the neck of the femur after resection of the femur head so that the back face of the plate rests against the truncated end of the femur neck, the front face of the plate further comprising means to permit seating of said spherical head by rotation using a suitable tool.

2. A hip prosthesis according to Claim 1, wherein the thread of said conical rod has a slight slope.

3. A hip prosthesis according to Claim 1 or Claim 2, wherein said spherical head is connected to said base removably.

4. A hip prosthesis according to any of Claims 1 to 3, wherein a recall screw is provided, the free end of the threaded rod having a tapped bore able to receive said threaded screw, the head of which is intended to bear against the cortex of the femur opposite the neck.

5. A hip prosthesis according to Claim 4, wherein the head of the recall screw rests against a curved plate which, in turn, is adapted to rest against the cortex of the femur, said plate being provided with a hole, and a screw for passing through such hole permitting its fastening to the femur, the head of the threaded screw being itself externally threaded and passing through a tapped hole in said plate.

6. A hip prosthesis substantially as hereinbefore described with reference to the accompanying drawing.

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